

December 10, 2020

Ms. Nancy Rumrill  
U.S. Environmental Protection Agency, Region 9  
Drinking Water Protection Services, WTR-3-2  
75 Hawthorne Street  
San Francisco, California 94105

**Re: Proposed Annular Conductivity Device Demonstration Submitted in Support of  
Application for Underground Injection Control Permit, Florence Copper Project,  
Florence, Arizona**

Dear Ms. Rumrill:

Florence Copper Inc. (Florence Copper) herewith transmits a description of a proposed annular conductivity device (ACD) demonstration to be conducted during commercial In-Situ Copper Recovery (ISCR) operations. This proposal is submitted in support of our application for an Underground Injection Control (UIC) Permit submitted to the U.S. Environmental Protection Agency (USEPA) on October 4, 2019 (Application). This proposal reflects our understanding of the requests stated by the USEPA in our November 4, 2020 phone call and has been updated in response to USEPA requests made on December 3 and December 10, 2020.

### **Background**

Florence Copper has proposed to install ACDs on the planned ISCR wells to monitor Part 2 mechanical integrity of the ISCR wells and to monitor vertical migration of injected solution if such were to occur. The placement, use, and contingency actions associated with the ACDs are described below. The USEPA has indicated that a demonstration of the effectiveness of the ACDs would be required during commercial ISCR operations and that additional contingency actions would be required in the event that the ACDs indicated vertical migration of injected fluid.

A summary of the proposed ACD placement and monitoring is provided below as a preface to the proposed ACD demonstration and associated contingency actions.

### **Summary of ACD Placement and Use**

#### **ACDs Installed at Limits of Underground Source of Drinking Water (USDW)**

Florence Copper has proposed to install two ACDs on each well at the limits of the exempted aquifer. One ACD will be installed at a point 10 feet below the middle fine-grained unit (MFGU), and a second ACD will be installed no more than 10 feet above the MFGU. In areas where the MFGU lies more than 200 feet

2. Perform standard annular pressure test to evaluate mechanical integrity.
3. Complete temperature log, nuclear magnetic resonance log, and dual induction logs to evaluate potential fluid movement outside of the well casing.
4. Repair the well.

In response to an above-background signal from individual ACDs installed on two or more adjacent wells, indicating possible mounding and upward migration of injected fluid, complete the following contingency actions. These contingency actions apply to ACDs installed at the limits of the USDW and the early warning ACDs.

1. Remove the wells from service.
2. Reduce the injection rate at adjacent injection wells by 50 percent or more.
3. Increase recovery of injected fluid at adjacent recovery wells.
4. Increase the frequency of ACD monitoring to weekly.
5. Perform standard annular pressure tests on the subject wells to evaluate mechanical integrity.
6. Complete temperature log, nuclear magnetic resonance log, and dual induction logs on the subject wells to evaluate potential fluid movement outside of the well casing.

### **Proposed ACD Demonstration**

The USEPA has indicated that a demonstration of the effectiveness of the ACDs would be required during commercial ISCR operations and that additional contingency actions would be required in the event that the ACDs indicated vertical migration of injected fluid. The USEPA indicated that the demonstration should include comparison of ACD readings from wells completed within a resource block with ACD readings from down gradient wells completed in the LBFU. The USEPA also indicated that contingency measures should include the additional monitoring wells installed within the resource block if the ACD comparison indicates vertical migration of injected fluid.

In response to this request, Florence Copper proposes the following ACD demonstration and contingency actions in addition to those described above. The proposed demonstration will begin with the commencement of ISCR operations and conclude with a comparison of ACD signals recorded 6 months after injection begins in the first resource block to be activated. This period of time will allow the flow field to fully develop and to allow the injected solution to mature.

### **Early Warning ACD Analysis (Demonstration)**

1. Prior to the commencement of injection, Florence Copper will collect baseline water quality samples from each of the ACD demonstration monitoring wells (M72-UBF and M73-LBF) and down gradient observation wells to be used in the ACD demonstration.
2. Monthly, Florence Copper will collect water quality samples from each of the ACD demonstration monitoring wells (M72-UBF and M73-LBF) and down gradient observation wells from the time that injection begins until the demonstration is completed at month six. Samples will be analyzed for the constituents listed in the quarterly monitoring table of the APP and UIC permit.

## Early Warning ACD Analysis Contingency Actions

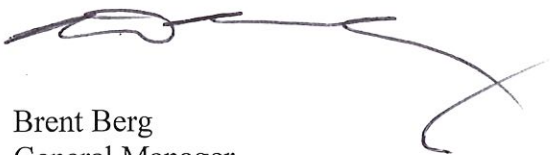
If the comparison of the population average ACD readings for the resource block and the down gradient ACDs shows a statistically significant increase within the resource block, Florence Copper will implement the following contingency actions:

1. Review the ACD data trends for each of the early warning ACDs installed within the resource block to identify the area where the greatest decrease in resistivity has occurred as described above in step 2 of the Early Warning ACD Analysis section.
2. Incorporate the newly installed monitoring wells (M72-UBF and M73-LBF) into the established monitoring program for the fault for the USDW and fault monitoring wells.

Florence Copper believes this proposal to be responsive to the USEPA request for an ACD demonstration and associated contingency actions. Florence Copper hereby requests that the USEPA incorporate these elements into the UIC Application.

Please contact me at 520-316-3710 if you require any additional information.

Sincerely,  
Florence Copper Inc.



Brent Berg  
General Manager

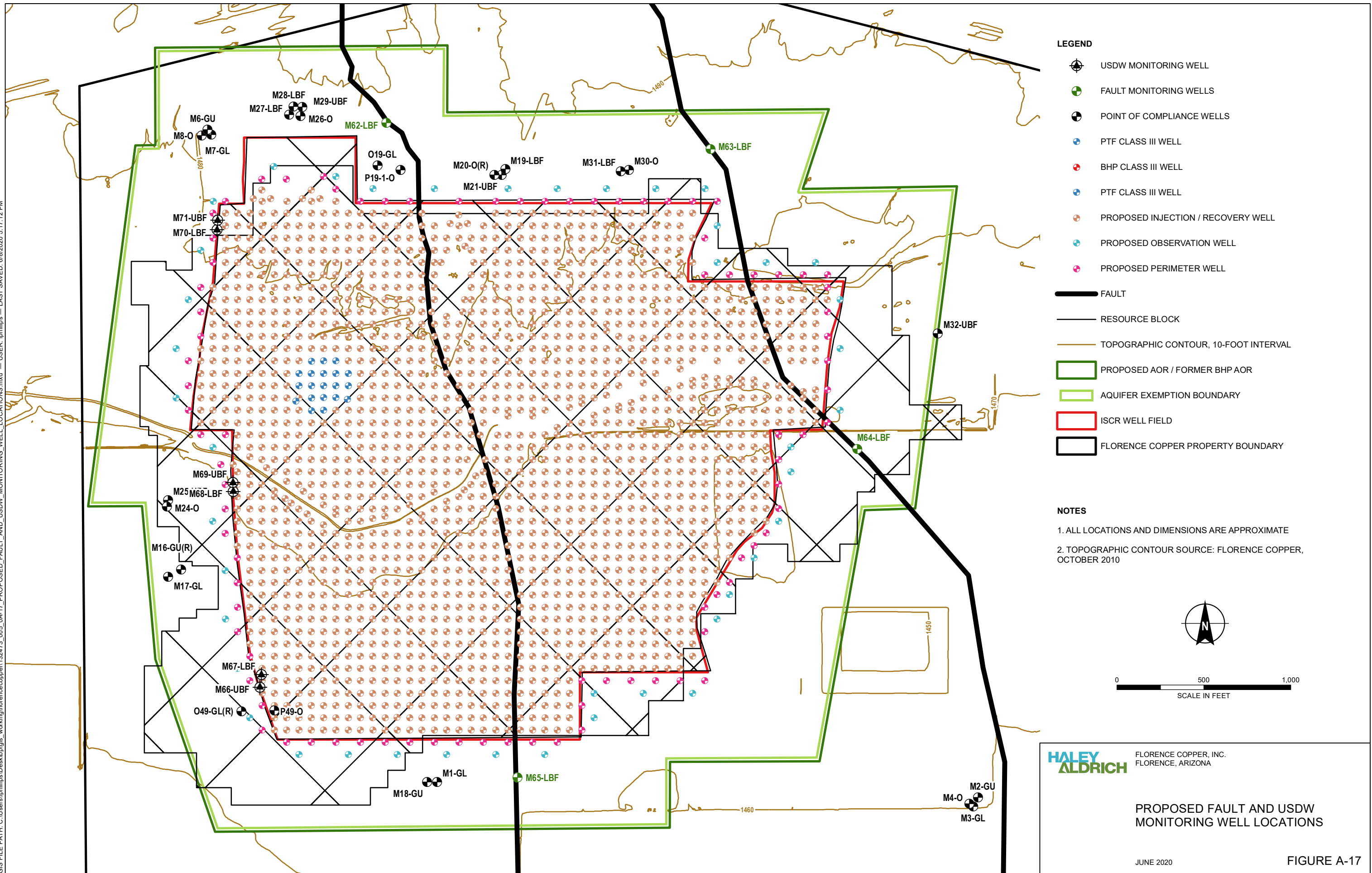
cc: Maribeth Greenslade, Arizona Department of Environmental Quality

Enclosures:

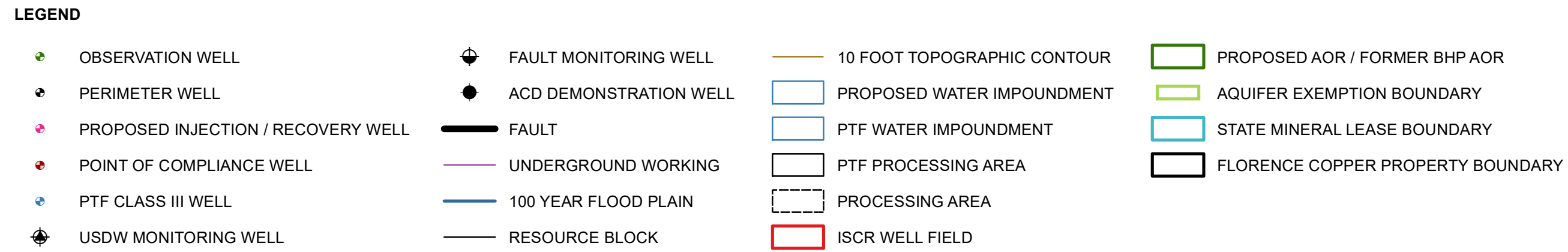
Figure A-17 – Proposed Fault and USDW Monitoring Well Locations  
Figure A-19 – Typical Observation and Perimeter Well Configuration



GIS FILE PATH: C:\Users\lphillips\Desktop\gis\_working\florencecopper\132473\_005\_0A-17\_PROPOSED\_FAULT\_AND\_USDW\_MONITORING\_WELL\_LOCATIONS.mxd — USER: lphillips — LAST SAVED: 6/8/2020 5:17:12 PM







1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE

2. TOPOGRAPHY DATA BY FLORENCE COPPER, OCTOBER 2010.  
10-FOOT INTERVALS SHOWN.

